Patent Application
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Daniel G. Schkolnik

Serial No.:	10/000,422	Group Art Unit: 2674
Filed:	October 31, 2001	Examiner: Duc Q. Dinh
For:	OPTICAL WINDOW FOR GENERATING WAVEFORMS	

Commissioner for Patents
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DECLARATION UNDER RULE 37 C.F.R. 1.132

I, Scott A. Prahl, do hereby declare the following:

1. My educational background consists of obtaining a Bachelor of Science degree in Applied Physics from the California Institute of Technology in 1982. I obtained a Ph.D. in Biomedical Engineering from the University of Texas at Austin in 1988.

2. My professional experience spans a period of time over 16 years. More specifically, I have worked as a Research Fellow, Instructor, Senior Research Scientist, Assistant Professor and Research Assistant Professor.

2. I am co-author of 39 Refereed Papers, four (4) Book Chapters and 31 Abstracts; co-participant in 52 Conference Proceedings; eight (8) Supervised Theses; and co-inventor of four (4) U.S. patents. Attached hereto as Exhibit A is the Curriculum Vitae of the undersigned, supporting his educational and professional involvement in the field of biomedical optics.

3. This patent application describes aperture shapes for use in the optical wheels of optical mice. As a mouse moves, the optical wheel rotates and light from an LED is successively blocked and transmitted by apertures, thereby creating a stroboscopic effect. The flickering light is sensed by an optical detector which produces a temporal waveform. Waveforms which are closer to square waves are most desirable for detecting movement since rapid transitions improve the precision with which the location of the mouse can be determined.

4. Rectangular apertures in the optical wheel are common in optical mice. Improving the temporal waveforms is currently done by electronic waveform processing. Redesigning the optical aperture will improve the raw signal and may even obviate some or all of the electronic waveform processing.

5. Matching an aperture shape to the incident light distribution is a common technique to produce a more uniform spatial spot. However, in this application, the aperture is designed to produce a more uniform temporal signal. The shape is optimized to enhance the rate at which the detected optical signal changes as the aperture moves in and out of the optical pathway between the LED and detector. The specific shape of the aperture is central to the utility of the invention - a circular aperture would maximize transmission, but would smooth the waveform and decrease the rate of transition.

6. It is not immediately obvious that the hourglass shape will improve the shape of the waveform. By making the top and bottom of the hourglass aperture wider, the precision of location would decrease. It is only in combination with the narrow waist of the hourglass aperture along the optical access that an improved waveform will result.

7. One could, in principle, use a narrower rectangular aperture, to improve the waveform shape, but this shape will not be as power efficient as the hourglass aperture, because more dim light will be collected. Another possible advantage of the hourglass shape, is that the hourglass shapes are likely to have fewer spurious optical diffraction effects than simple rectangular shapes. Optical diffraction will only add noise to the waveform.

I, the undersigned, declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

DATED this 12th day of January, 2005.

Scott Prahl

Scott A. Prahl, Ph.D.

Date prepared: 4/04

Name

Scott Prahl, Ph.D. Assistant Professor

Education

California Institute of Technology	1982	B.S.	Applied Physics
University of Texas at Austin	1988	Ph.D.	Biomedical Engineering

Professional Experience

1988 – 1989	*Research fellow*, Academic Medical Center, Amsterdam
1990 – 1991	*Research fellow*, Massachusetts General Hospital, Boston
1991 – 1993	*Instructor*, Harvard Medical School, Boston
1993 – Present	*Senior Research Scientist*, Oregon Medical Laser Center, Portland
1993 – Present	*Assistant Professor*, Oregon Graduate Institute, Portland
1993 – Present	*Research Assistant Professor*, Oregon Health Sciences University, Portland

Awards and Other Professional Activities

1991	Dermatology Foundation Award
1995 - Present	Editorial Board, Lasers in Medicine and Surgery
1995 - Present	Physics Chairman, Oregon Academy of Science
2001	Distinguished Teaching Award - Oregon Graduate Institute

Refereed Papers

[1] P. A. Patel, J. W. Valvano, J. A. Pearce, S. A. Prahl, and C. R. Denham. A self-heated thermistor technique to measure effective thermal properties from the tissue surface. *J. Biomechanical Engineering*, 109:330–335, 1987.

[2] S. L. Jacques, C. A. Alter, and S. A. Prahl. Angular dependence of HeNe laser light scattering by human dermis. *Lasers Life Sci.*, 1:309–333, 1987.

[3] S. L. Jacques and S. A. Prahl. Modeling optical and thermal distributions in tissue during laser irradiation. *Lasers Surg. Med.*, 6:494–503, 1987.

[4] G. Yoon, S. A. Prahl, and A. J. Welch. Accuracies of the diffusion approximation and its similarity relations for laser irradiated biological media. *Appl. Opt.*, 28:2250–2255, 1989.

[5] M. Keijzer, S. L. Jacques, S. A. Prahl, and A. J. Welch. Light distributions in artery tissue: Monte Carlo simulations for finite-diameter laser beams. *Lasers Surg. Med.*, 9:148–154, 1989. monte carlo.

[6] C. J. M. Moes, M. J. C. van Gemert, W. M. Star, J. P. A. Marijnissen, and S. A. Prahl. Measurements and calculations of the energy fluence rate in a scattering and absorbing phantom at 633 nm. *Appl. Opt.*, 28:2292–2296, 1989.

[7] M. R. Prince, G. M. LaMuraglia, C. E. Seidlitz, S. A. Prahl, C. A. Athanasoulis, and R. Birngruber. Ball-tipped fibers for laser angioplasty with the pulsed-dye laser. *IEEE J. Quantum Electron.*, 26:2297–2304, 1990.

[8] W. F. Cheong, S. A. Prahl, and A. J. Welch. A review of the optical properties of biological tissues. *IEEE J. Quantum Electron.*, 26:2166–2185, 1990.

[9] E. L. Koschmieder and S. A. Prahl. Surface tension driven Bénard convection in small containers. *J. Fluid Mechanics*, 215:571–583, 1990.

[10] H. J. van Staveren, C. J. M. Moes, J. van Marle, S. A. Prahl, and M. J. C. van Gemert. Light scattering in Intralipid-10% in the wavelength range of 400–1100 nm. *Appl. Opt.*, 31:4507–4514, 1991.

[11] J. W. Pickering, C. J. M. Moes, H. J. C. M. Sterenborg, S. A. Prahl, and M. J. C. van Gemert. Two integrating sphere with an intervening scattering sample. *J. Opt. Soc. Am. A*, 9:621–631, 1992.

[12] S. A. Prahl, I. A. Vitkin, U. Bruggemann, B. C. Wilson, and R. R. Anderson. Determination of optical properties of turbid media using pulsed photothermal radiometry. *Phys. Med. Biol.*, 37:1203–1217, 1992.

[13] J. W. Pickering, S. A. Prahl, N. van Wieringen, J. F. Beek, H. J. C. M. Sterenborg, and M. J. C. van Gemert. Double-integrating-sphere system for measuring the optical properties of tissue. *Appl. Opt.*, 32:399–410, 1993.

[14] S. A. Prahl, M. J. C. van Gemert, and A. J. Welch. Determining the optical properties of turbid media by using the adding-doubling method. *Appl. Opt.*, 32:559–568, 1993.

[15] I. A. Vitkin, B. C. Wilson, R. R. Anderson, and S. A. Prahl. Pulsed photothermal radiometry in optically transparent media containing discrete optical absorbers. *Phys. Med. Biol.*, 39:1721–1744, 1994.

[16] D. D. Royston, R. S. Poston, and S. A. Prahl. Optical properties of scattering and absorbing materials used in the development of optical phantoms at 1064 nm. *J. Biomedical Optics*, 1:110–116, 1996.

[17] U. S. Sathyam, A. Shearin, E. A. Chasteney, and S. A. Prahl. Threshold and ablation efficiency studies of microsecond ablation of gelatin under water. *Lasers Surg. Med.*, 19:397–406, 1996.

[18] H. Shangguan, L. W. Casperson, A. Shearin, K. W. Gregory, and S. A. Prahl. Drug delivery with microsecond laser pulses into gelatin. *Appl. Opt.*, 35:3347–3357, 1996.

[19] H. Shangguan, L. W. Casperson, and S. A. Prahl. Microsecond laser ablation of thrombus and gelatin under clear liquids: Contact vs non-contact. *IEEE J. Selected Topics Quantum Electron.*, 2:818–825, 1996.

[20] U. S. Sathyam and S. A. Prahl. Limitations in measurement of subsurface temperatures using pulsed photothermal radiometry. *J. Biomed. Opt.*, 2:251–261, 1997.

[21] E. N. La Joie, A. D. Barofsky, K. W. Gregory, and S. A. Prahl. Patch welding with a pulsed diode laser and indocyanine green. *Laser Med. Sci.*, 12:49–54, 1997.

[22] H. Shangguan, L. W. Casperson, and S. A. Prahl. Pressure impulses during microsecond laser ablation. *Appl. Opt.*, 36:9034–9041, 1997.

[23] H. Shangguan, L. W. Casperson, D. L. Paisley, and S. A. Prahl. Photographic studies of laser-induced bubble formation in absorbing liquids and on submerged targets: implications for drug delivery with microsecond laser pulses. *Optical Engineering*, 37:2217–2226, 1998.

[24] H. Shangguan, K. W. Gregory, L. W. Casperson, and S. A. Prahl. Enhanced laser thrombolysis with photomechanical drug delivery: An *In Vitro* study. *Lasers Surg. Med.*, 23:151–160, 1998.

[25] J. A. Viator, S. L. Jacques, and S. A. Prahl. Depth profiling of absorbing soft materials using photoacoustic methods. *IEEE Journal of Selected Topics in Quantum Electronics*, 5:989–996, 1999.

[26] J. A. Viator and S. A. Prahl. Laser thrombolysis using long pulse frequency-doubled Nd:YAG lasers. *Lasers in Surgery and Medicine*, 25:379–388, 1999.

[27] T. P. Moffitt and S. A. Prahl. Sized-fiber reflectometry for measuring local optical properties. *IEEE JSTQE*, 7:952–958, 2001.

[28] J. A. Viator, G. Au, G. Paltauf, S. L. Jacques, S. A. Prahl, H. Ren, Z. Chen, and J. Stuart Nelson. Clinical testing of a photoacoustic probe for port wine stain depth determination. *Lasers in Surgery and Medicine*, 30:141–148, 2002.

[29] A. D. Janis, L. A. Buckley, A. N. Nyara, S. A. Prahl, and K. W. Gregory. A reconstituted in vitro clot model for evaluating laser thrombolysis. *J. Thrombosis and Thrombolysis*, 13:167–175, 2002.

[30] T. P. Moffitt, D. Baker, S. J. Kirkpatrick, and S. A. Prahl. Mechanical properties of coagulated albumin and failure mechanisms of liver repaired using an argon beam coagulator with albumin. *J. Biomedical Materials Research (Applied Biomaterials)*, 63:722–728, 2002.

[31] G. Paltaulf, J. A. Viator, S. A. Prahl, and S. L. Jacques. Iterative reconstruction method for three-dimensional optoacoustic imaging. *Journal of Acoustic Society of America*, 112:1536–1544, 2002.

[32] Ronald F. Wolf, Hua Xie, John Petty, Jeff S. Teach, and Scott A. Prahl. Argon ion beam hemostasis with albumin following liver resection. *Am. J. Surg.*, 183:584–587, 2002.

[33] H. Xie, B. S. Shaffer, S. A. Prahl, and K. W. Gregory. Intraluminal albumin stent assisted laser welding for ureteral anastomosis. *Laser Surg. Med.*, 31:225–229, 2002.

[34] Paulo R. Bargo, Scott A. Prahl, and Steven L. Jacques. Optical properties effects upon the collection efficiency of optical fibers in different probe configurations. *IEEE J. Selected Topics Quantum Electron.*, 9:314–321, 2003.

[35] Jessica C. Ramella-Roman, Paulo R. Bargo, Scott A. Prahl, and Steven L. Jacques. Evaluation of spherical particle sizes with an asymmetric illumination microscope. *IEEE J. Selected Topics Quantum Electron.*, 9:301–306, 2003.

[36] Stefan A. Carpyz, Scott A. Prahl, and Vasan Venugopalan. Radiative transport in the δ-P_1 approximation: Accuracy of fluence rate and optical penetration depth predictions in turbid semi-infinite media. *Journal of Biomedical Optics*, (accepted), 2004.

[37] Yinchu Chen, Sean J. Kirkpatrick, and Scott A. Prahl. Measurement of changes in concentrations of biological solutions using a Rayleigh interferometer. In V. V. Tuchin, editor, *SPIE Saratov Fall Meeting 2002: Optical Technologies in Biophysics & Medicine IV*, volume 5068, pages 273–283, 2003.

[38] H. Xie, R. F. Wolf, J. Petty, A. Burke, J. S. Teach, K. W. Gregory, and S. A. Prahl. Hemostasis after partial hepatectomy using argon beam coagulation and concentrated albumin. *J. Biomaterials Research*, (accepted), 2004.

[39] H. Xie, B. S. Shaffer, S. A. Prahl, and K. W. Gregory. Intraluminal albumin stent-assisted laser welding for ureteral anastomosis. *J. Endourology*, (submitted), 2004.

Patents

[1] R. R. Anderson, N. Bhatta, S. Prahl, and P. J. Dwyer. Laser illuminator. *United States Patent. No. 5,527,308*, 1996.

[2] L. A. Buckley, S. A. Prahl, and S. L. Jacques. Method and apparatus for determination of psoralen concentrations in biological tissues. *United States Patent. No. 5,522,868*, 1996.

[3] S. A. Prahl and S. L. Jacques. Multiple diameter fiber optic device and process of using the same. *United States Patent. No. 6,014,204*, 1998.

[4] Y. Wadia and S. A. Prahl. Biocompatible albumin lamina and method. *United States Patent. No. 6,680,063*, 2004.

Supervised Theses

[1] J. A. Viator. *Characterization of photoacoustic sources in tissue using time domain measurements.* PhD thesis, Oregon Graduate Institute of Science and Technology, 2001.

[2] H. Shangguan. *Local Drug Delivery with Microsecond Laser Pulses:* In vitro *Studies.* PhD thesis, Portland State University, 1996.

[3] K. S. Kumar. Spectroscopy of indocyanine green photodegradation. Master's thesis, Oregon Graduate Institute of Science and Technology, 1996.

[4] U. S. Sathyam. *Laser Thrombolysis: Basic Ablation Studies.* PhD thesis, Oregon Graduate Institute of Science and Technology, 1996.

[5] S. Pearson. Mechanical strength studies of steady-state thermal and pulsed laser tissue welding. Master's thesis, Oregon Graduate Institute of Science and Technology, 1996.

[6] S. D. Robinson. Measurement of 8-methoxypsoralen concentration using fluorescence. Master's thesis, Oregon Graduate Institute of Science and Technology, 1995.

[7] E. N. La Joie. Tissue welding: Studies of pulsed diode laser interaction with ICG stained porcine aorta and elastin-based biomaterial. Master's thesis, Oregon Graduate Institute of Science and Technology, 1995.

[8] S. A. Prahl. *Light Transport in Tissue.* PhD thesis, University of Texas at Austin, 1988.

Book Chapters

[1] S. A. Prahl. Pulsed photothermal radiometry of inhomogeneous tissue. In A. Mandelis and P. Hess, editors, *Progress in Photothermal and Photoacoustic Science and Technology Series: Life and Earth Sciences*, volume 3, pages 516–438. SPIE Optical Engineering Press, 1997.

[2] S. A. Prahl. The adding-doubling method. In A. J. Welch and M. J. C. van Gemert, editors, *Optical-Thermal Response of Laser Irradiated Tissue*, chapter 5, pages 101–129. Plenum Press, 1995.

[3] S. A. Prahl. The diffusion approximation in three dimensions. In A. J. Welch and M. J. C. van Gemert, editors, *Optical-Thermal Response of Laser Irradiated Tissue*, chapter 7, pages 207–231. Plenum Press, 1995.

[4] M. J. C. van Gemert, S. A. Prahl, and A. J. Welch. Lichtausbreitung und Streuung in trüben Medien. In G. Müller and H. P. Berlien, editors, *Angewandte Lasermedizin: Lehr- und Handbuch für Praxis und Klinik*, chapter II-3.1.2, pages 1–10. ecomed verlagsgesellshaft mbH, München, 1989.

Conference Proceedings

[1] P. A. Patel, J. W. Valvano, S. A. Prahl, and C. R. Denham. A self-heated thermistor technique to measure blood flow from the tissue surface. In *ASME Winter Annual Meeting*, volume HTD 61, pages 11–16, Anaheim, CA, December 1986.

[2] P. A. Patel, J. W. Valvano, and S. A. Prahl. Perfusion measurement by a surface thermal probe. In *IEEE/Ninth Annual Conference of the Engineering in Medicine and Biology Society*, pages 28–29, Boston, MA, 1987. IEEE.

[3] J. W. Valvano, S. A. Prahl, J. C. Chan, and J. A. Pearce. Thermal camera imaging to measure tissue blood flow. In *Sixth Southern Biomedical Engineering Conference*, Dallas, TX, 1987.

[4] J. C. Chan, J. W. Valvano, J. A. Pearce, L. J. Hayes, and S. A. Prahl. Thermal camera imaging to measure perfusion from the tissue surface. In J. W. Clark, P. I. Horner, A. R. Smith, and K. Strum, editors, *Phys. Med. Biol.*, volume 33, page 408, San Antonio, TX, 1988.

[5] G. L. LeCarpentier, S. Rastegar, A. J. Welch, S. A. Prahl, and H. Hussein. Comparative analysis of laser ablation of plaque using direct laser irradiation and a metal contact probe. In J. W. Clark, P. I. Horner, A. R. Smith, and K. Strum, editors, *Phys. Med. Biol.*, volume 33, page 17, San Antonio, TX, 1988.

[6] S. A. Prahl, W. F. Cheong, G. Yoon, and A. J. Welch. Optical properties of human aorta during low power argon laser irradiation. In *SPIE Proceedings of Laser Interaction with Tissue*, volume 908, pages 29–33, 1988.

[7] S. A. Prahl, M. Keijzer, S. L. Jacques, and A. J. Welch. A Monte Carlo model of light propagation in tissue. In G. J. Müller and D. H. Sliney, editors, *SPIE Proceedings of Dosimetry of Laser Radiation in Medicine and Biology*, volume IS 5, pages 102–111, 1989. monte carlo.

[8] S. L. Jacques, L. Buckley, S. Prahl, and K. Gregory. Quantifying psoralen in tissues by fluorescence: Dosimetry for psoralen administration followed by ultraviolet A irradiation (PUVA) to block restenosis. In G. S. Abela, editor, *SPIE Proceedings of Diagnostic and Therapeutic Cardiovascular Interventions IV*, volume 2130, pages 82–88, 1994.

[9] E. N. La Joie, A. D. Barofsky, K. W. Gregory, and S. A. Prahl. Welding artificial biomaterial with a pulsed diode laser and indocyanine green. In R. R. Anderson, editor, *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems V*, volume 2395, pages 508–516, 1995.

[10] H. Shangguan, L. W. Casperson, A. Shearin, K. W. Gregory, and S. A. Prahl. Photoacoustic drug delivery: the effect of laser parameters on spatial distribution of delivered drug. In S. L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction VI*, volume 2391, pages 394–402, 1995.

[11] U. S. Sathyam, A. Shearin, and S. A. Prahl. The effect of spotsize, pulse energy, and repetition rate on microsecond ablation of gelatin under water. In S. L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction VI*, volume 2391, pages 336–344, 1995.

[12] S. A. Prahl. Charts for rapid estimation of spatial and temporal distribution of temperature following laser irradiation. In S. L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction VI*, volume 2391, pages 499–511, 1995.

[13] H. Shangguan, L. W. Casperson, A. Shearin, and S. A. Prahl. Investigation of cavitation bubble dynamics using particle image velocimetry: implications for photoacoustic drug delivery. In R. R. Anderson and A. Katzir, editors, *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems VI*, volume 2671, pages 104–115, 1996.

[14] U. S. Sathyam, A. Shearin, and S. A. Prahl. Visualization of microsecond laser ablation of porcine clot and gelatin under a clear liquid. In R. R. Anderson and A. Katzir, editors, *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems VI*, volume 2671, pages 28–35, 1996.

[15] E. J. Chapyak, R. P. Godwin, S. A. Prahl, and H. Shangguan. Comparison of numerical simulations and laboratory studies of laser thrombolysis. In R. R. Anderson, K. E. Bartels, L. S. Bass, K. W. Gregory, D. M. Harris, H. Lui, R. S. Malek, G. J. Mueller, M. M. Pankratov, A. P. Perlmutter, H. Reidenbach, L. P. Tate, and G. M. Watson, editors, *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems VII*, volume 2970, pages 28–34, 1997.

[16] H. Shangguan, L. W. Casperson, A. Shearin, D. L. Paisley, and S. A. Prahl. Effects of material properties on laser-induced bubble formation in absorbing liquids and on submerged targets. In D. L. Paisley and A. M. Frank, editors, *Proceedings of the 22nd International Congress on High-Speed Photography and Photonics*, volume 2869, pages 783–791, 1997.

[17] B. S. Amurthur, J. A. Viator, and S. A. Prahl. Acoustic cavitation events during microsecond irradiation of aqueous solutions. In R. R. Anderson et al., editors, *SPIE Proceedings of Diagnostic and Therapeutic Cardiovascular Interventions VII*, volume 2970, pages 4–9, 1997.

[18] H. Shangguan, L. W. Casperson, K. W. Gregory, and S. A. Prahl. Penetration of fluorescent particles in gelatin during laser thrombolysis. In R. R. Anderson, K. E. Bartels, L. S. Bass, K. W. Gregory, D. M. Harris, H. Lui, R. S. Malek, G. J. Mueller, M. M. Pankratov, A. P. Perlmutter, H. Reidenbach, L. P. Tate, and G. M. Watson, editors, *SPIE Proceedings of Diagnostic and Therapeutic Cardiovascular Interventions VII*, volume 2970, pages 10–18, 1997.

[19] S. A. Prahl and S. D. Pearson. Rate process models for thermal laser welding. In S. L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction VIII*, volume 2975, pages 245–252, 1997.

[20] U. S. Sathyam, A. Shearin, and S. A. Prahl. Basic ablation phenomena during laser thrombolysis. In R. R. Anderson et al., editors, *SPIE Proceedings of Diagnostic and Therapeutic Cardiovascular Interventions VII*, volume 2970, pages 19–27, 1997.

[21] U. S. Sathyam and S. A. Prahl. Limitations in measurement of subsurface temperatures using pulsed photothermal radiometry. *J. Biomed. Opt.*, 2:251–261, 1997.

[22] Steven L. Jacques, Andrew D. Barofsky, HanQun Shangguan, Scott A. Prahl, and Kenton W. Gregory. Laser welding of biomaterials stained with indocyanine green to tissues. In Steven L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction VIII*, volume 2975, pages 54–61, 1997.

[23] M.-A. Descalle, S. L. Jacques, S. A. Prahl, T. L. Laing, and W. R. Martin. Measurements of ligament and cartilage optical properties at 351 nm, 365 nm, and in the visible range (440 to 800 nm). In Guy P. Delacretaz, Lars O. Svaasand, Rudolf W. Steiner, Roberto Pini, and Guilhem Godlewski, editors, *SPIE Proceedings of Laser-Tissue Interaction, Tissue Optics, and Laser Welding III*, volume 3195, pages 280–286, 1998.

[24] R. P. Godwin, E. J. Chapyak, S. A. Prahl, and H. Shangguan. Laser mass-ablation efficiency measurements indicate bubble-driven dynamics dominate laser thrombolysis. In R. R. Anderson, K. E. Bartels, L. S. Bass, C. G. Garrett, K. W. Gregory, H. Lui, R. S. Malek, A. P. Perlmutter, L. Reinisch, P. J. Smalley, L. P. Tate, S. L. Thomsen, and G. M. Watson, editors, *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems VIII*, volume 3245, pages 4–11, 1998.

[25] S. A. Prahl and S. L. Jacques. Sized-fiber array spectroscopy. In S. L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction IX*, volume 3254, pages 348–352, 1998.

[26] H. Shangguan, S. A. Prahl, S. L. Jacques, L. W. Casperson, and K. W. Gregory. Pressure effects on soft tissues monitored by changes in tissue optical properties. In S. L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction IX*, volume 3254, pages 366–371, 1998.

[27] H. Shangguan, L. W. Casperson, D. L. Paisley, and S. A. Prahl. Photographic studies of laser-induced bubble formation in absorbing liquids and on submerged targets: implications for drug delivery with microsecond laser pulses. *Optical Engineering*, 37:2217–2226, 1998.

[28] J. A. Viator, S. L. Jacques, and S. A. Prahl. Generating subsurface acoustic waves in indocyanine green stained elastin biomaterial using a Q-switched laser. In S. L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction IX*, volume 3254, pages 104–111, 1998.

[29] J. A. Viator and S. A. Prahl. Laser thrombolysis using a millisecond frequency-doubled Nd:YAG laser. In S. L. Jacques, editor, *SPIE Proceedings of Laser-Tissue Interaction IX*, volume 3254, pages 287–291, 1998.

[30] J. A. Viator and S. A. Prahl. Photoacoustic imaging of gelatin phantoms using matched field processing. In S. L. Jacques, G. J. Müller, A. Roggan, and D. H. Sliney, editors, *SPIE Proceedings of Laser-Tissue Interaction X*, volume 3601, pages 276–283, 1999.

[31] H. Xie, B. S. Schafer, S. A. Prahl, and K. W. Gregory. Sutureless end-to-end ureteral anastomosis using a new albumin stent and diode laser. In Q. Luo, B. Chance, L. V. Wang, and S. L. Jacques, editors, *1999 International Conference on Biomedical Optics*, volume 3683, pages 398–406, 1999.

[32] T. P. Moffitt and S. A. Prahl. In-vivo sized-fiber spectroscopy. In R. R. Alfano, editor, *SPIE Proceedings on Optical Biopsy III*, volume 3917, pages 225–231, 2000.

[33] J. A. Viator, G. Paltauf, S. L. Jacques, and S. A. Prahl. Localization of spherical photoacoustic sources in acrylamide gels using time domain measurements. In A. A. Oraevsky, editor, *SPIE Proceedings of Biomedical Optoacoustics*, volume 3916, pages 89–99, 2000.

[34] Y. Wadia, H. Xie, M. Kajitani, and S. A. Prahl. Liver repair and hemorrhage control using laser soldering of liquid albumin in a porcine model. In R. Rox Anderson et al., editors, *SPIE Proceedings of Lasers in Surgery*, volume 3907, pages 74–81, 2000.

[35] H. Xie, B. S. Schafer, S. A. Prahl, and K. W. Gregory. Laser welding with an albumin stent: experimental ureteral end-to-end anastomosis. In R. Rox Anderson et al., editors, *SPIE Proceedings of Lasers in Surgery*, volume 3907, pages 215–220, 2000.

[36] G. Paltaulf, J. A. Viator, S. A. Prahl, and S. L. Jacques. Iterative reconstruction method for three-dimensional optoacoustic imaging. In Alexander A. Oraevsky, editor, *SPIE Proceedings of Biomedical Optoacoustics*, volume 4256, pages 138–146, 2001.

[37] S. A. Prahl, T. Denison, and E. N. La Joie. Laser repair of liver. In R. R. Anderson et al., editors, *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics and Systems XI*, volume 4244, pages 215–219, 2001.

[38] J. A. Viator, G. Paltauf, S. L. Jacques, and S. A. Prahl. Design and testing of an endoscopic photoacoustic probe for determining treatment depth after photodynamic therapy of esophageal cancer. In A. A. Oraevsky, editor, *SPIE Proceedings of Biomedical Optoacoustics II*, volume 4256, pages 16–27, 2001.

[39] H. Xie, L. A. Buckley, S. A. Prahl, B. S. Schafer, and K. W. Gregory. Thermal damage control of dye-assisted laser tissue welding: effect of dye concentration. In R. R. Anderson et al., editors, *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics and Systems XI*, volume 4244, pages 189–192, 2001.

[40] P. R. Bargo, S. A. Prahl, and S. L. Jacques. Collection efficiency of a single optical fiber in turbid media for reflectance spectroscopy. In *OSA Biomedical Topical Meetings*, pages 604–606, Washington, D.C., 2002. Optical Society of America.

[41] Jennifer J. Brazier, Mingdi Yan, S. A. Prahl, and Yin-Chu Chen. Molecularly imprinted polymers used as optical waveguides for the detection of fluorescent analytes. In K. J. Shea, M. J. Roberts, and M. Yan, editors, *Materials Research Society Proceedings of Molecularly Imprinted Materials-Sensor and Other Devices*, volume 723, pages 115–120, 2002.

[42] A. D. Janis, K. W. Gregory, S. J. Kirkpatrick, and S. A. Prahl. Effects of in-vitro target compression modulus on laser thrombolytic ablation rate. In *SPIE Proceedings on Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems XII*, volume 4609, pages 419–429, 2002.

[43] T. P. Moffitt and S. A. Prahl. Determining the reduced scattering of skin in vivo using sized-fiber reflectometry. In *SPIE Proceedings on Optical Biopsy IV*, volume 4613, pages 254–263, 2002.

[44] T. P. Moffitt, D. A. Baker, S. J. Kirkpatrick, and S. A. Prahl. Mechanical properties of repaired liver using an argon beam coagulator with albumin. In *SPIE Proceedings on Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems XII*, volume 4609, pages 178–185, 2002.

[45] S. A. Prahl. Simple and accurate approximations for reflectance from a semi-infinite turbid medium. In *OSA Biomedical Topical Meetings*, pages 613–614, Washington, D.C., 2002. Optical Society of America.

[46] S. A. Prahl. Semi-analytic model for fiber-based fluorescence measurements. In *OSA Biomedical Topical Meetings*, pages 717–718, Washington, D.C., 2002. Optical Society of America.

[47] H. Xie, R. Wolf, J. Petty, A. Burke, J. S. Teach, K. W. Gregory, and S. A. Prahl. Hemostasis after partial hepatectomy using argon beam coagulation and a concentrated albumin. In *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics and Systems XII*, volume 4609, pages 186–194, 2002.

[48] Yinchu Chen, Sean J. Kirkpatrick, and Scott A. Prahl. Measurement of changes in concentrations of biological solutions using a Rayleigh interferometer. In V. V. Tuchin, editor, *SPIE Saratov Fall Meeting 2002: Optical Technologies in Biophysics & Medicine IV*, volume 5068, pages 273–283, 2003.

[49] Jessica C. Ramella-Roman, Kenneth Lee, Scott A. Prahl, and Steven L. Jacques. Polarized light imaging with a handheld camera. In Valery V. Tuchin, editor, *SPIE Saratov Fall Meeting 2002: Optical Technologies in Biophysics and Medicine IV*, volume 5068, 2003.

[50] Theodore P. Moffitt and Scott A. Prahl. The specular reflection problem with a single fiber for emission and collection. In Valery V. Tuchin, editor, *SPIE Saratov Fall Meeting 2002: Optical Technologies in Biophysics and Medicine IV*, volume 5068, 2003.

[51] Zhen Ren, Anthony Furnary, Hua Xie, Kathryn A. Lagerquist, Allen Burke, Scott A. Prahl, and Kenton W. Gregory. Optimal dye concentration and power density for laser-assisted vascular anatomosis (lava). In Lawrence S. Bass, Nikiforos Kollias, Reza S. Malek, Abraham Katzir, Udayan K. Shah, Brian J. F. Wong, Eugene A. Trowers, Timothy A. Woodward, Werner T. W. de Riese, David S. Robinson, Hans-Dieter Reidenbach, Keith D. Paulsen, and Kenton W. Gregory, editors, *SPIE Proceedings of Lasers in Surgery: Advanced Characterization, Therapeutics, and Systems XIII*, volume 4949, 2003.

[52] Hua Xie, Ronald F. Wolf, Jeffery S. Teach, Allen Burke, Kenton W. Gregory, and Scott A. Prahl. Concentrated albumin for hemorrhage control on hepatic resection with argon ion beam coagulation: A long-term evaluation in a porcine model. In *2003 Annual Meeting Transactions*. Society for Biomaterials, 2003.

Abstracts

[1] John A. Viator and Scott A. Prahl. Indocyanine green deposition in aortic heterograft after photobleaching with an 800 nm 5 millisecond diode laser pulse. *Proceedings of the Oregon Academy of Science*, 34:41–42, 1998 (abstract).

[2] S. L. Jacques and S. A. Prahl. The physics of laser welding for tissue anatamosis: welding with ICG-stained elastin heterografts. *Lasers Surg. Med.*, S9:48, 1997 (abstract).

[3] H. Shangguan, L. W. Casperson, and S. A. Prahl. Contact versus noncontact ablation efficacy of thrombus in an aqueous environment. *Lasers Surg. Med.*, S9:10, 1997 (abstract).

[4] J. A. Viator, U. S. Sathyam, A. Shearin, and S. A. Prahl. Ablation efficiency measurements of soft materials with a small optical fiber. *Lasers Surg. Med.*, S9:4, 1997 (abstract).

[5] John A. Viator, Alan Shearin, and Scott Prahl. Ablation studies of thrombus phantoms using a 100 μs Nd:YAG laser at 532 nm. *Proceedings of the Oregon Academy of Science*, 33:51–52, 1997 (abstract).

[6] S. A. Prahl, H. Shangguan, M. Girsky, and K. Gregory. Localized drug delivery in thrombus and gelatin using microsecond laser pulses. *Photobiol. Photochem.*, 63S:39, 1996 (abstract).

[7] K. S. Kumar and S. A. Prahl. Dye-enhanced laser tissue welding: reflectance studies. *Proceedings of the Oregon Academy of Science*, 32, 1996 (abstract).

[8] S. Pearson and S. A. Prahl. Thermal characterization of porcine intestine for laser tissue welding. *Proceedings of the Oregon Academy of Science*, 32, 1996 (abstract).

[9] M. J. Girsky, K. W. Gregory, A. S. Shearin, and S. A. Prahl. Photoacoustic drug delivery to arterial thrombus — a new method for local drug delivery. *Circulation*, 94 (Suppl. I):I–201, 1996 (abstract).

[10] H. Shangguan, L. W. Casperson, L. A. Buckley, and S. A. Prahl. Quantitative analysis of psoralen in blood serum with laser-induced fluorescence. *Bull. Am. Physical Society*, 1995 (abstract).

[11] H. Shangguan, L. W. Casperson, and S. A. Prahl. The effect of absorption coefficient and radiant exposure on the threshold of cavitation bubble formation in light absorbing liquids. *Proceedings of the Oregon Academy of Science*, 31:51, 1995.

[12] H. Shangguan, A. Shearin, and S. A. Prahl. Visualization of photoacoustic drug delivery dynamics. *Lasers Surg. Med.*, S7:4–5, 1995 (abstract).

[13] U. S. Sathyam and S. A. Prahl. Pulsed photothermal radiometry of buried light-absorbing layers. *Bull. Am. Physical Society*, 1995 (abstract).

[14] U. S. Sathyam, A. Shearin, and S. A. Prahl. Effect of bubble dynamics on ablation efficiency during microsecond laser ablation of gelatin under water. *Proceedings of the Oregon Academy of Science*, 31:52, 1995 (abstract).

[15] U. S. Sathyam, A. Shearin, and S. A. Prahl. The effect of absorption coefficient on microsecond ablation thresholds under water. *Lasers Surg. Med.*, S7:5, 1995 (abstract).

[16] L. A. Buckley, S. L. Jacques, S. A. Prahl, and K. W. Gregory. Measurement of serum psoralen levels using fluorescence. *Lasers Surg. Med.*, S6:1, 1994 (abstract).

[17] U. S. Sathyam, A. Shearin, E. A. Chasteney, and S. A. Prahl. The effect of absorption on 2 μs ablation efficiency under water. *Lasers Surg. Med.*, S6:5, 1994 (abstract).

[18] U. S. Sathyam, A. Shearin, and S. A. Prahl. Bubble dynamics during 2 μs pulsed-dye laser ablation under water. *Lasers Surg. Med.*, S6:5–6, 1994 (abstract).

[19] E. A. Chasteney, S. A. Prahl, and K. W. Gregory. A simple model for spectrophotometric determination of thrombus ablation mass. *Laser Med. Surg.*, S6:62, 1994 (abstract).

[20] S. A. Prahl, U. Bruggemann, and R. R. Anderson. Pulsed photothermal radiometry of human skin following exposure to mid-ultraviolet light. In *SPIE Proceedings of Lasers in Dermatology and Plastic Surgery*, 1992 (abstract).

[21] S. A. Prahl, N. Kollias, and R. R. Anderson. Light scattering in biologic tissues. *Photochem. Photobiol.*, June 1992 (abstract).

[22] S. A. Prahl. Non-invasive quantification of chromophores in skin using reflection. *Third Annual Meeting of the European Society for Pigment Cell Research*, 1991 (abstract).

[23] S. A. Prahl, N. van Wieringen, M. J. C. van Gemert, and A. J. Welch. Iterated adding-doubling to determine optical properties. San Jose, November 1991.

[24] N. van Wieringen, S. A. Prahl, H. J. C. M. Sterenborg, and M. J. C. van Gemert. The limitations of the determination of the optical properties of tissue using a double integrating sphere set-up with collimated incident light. *Lasers Med. Sci.*, 1990.

[25] D. P. Noske, S. A. Prahl, H. J. C. M. Sterenborg, J. G. Wolbers, and W. Kamphorst. Digital imaging of HpD distribution in normal rat brain after intracerebral HpD administration. *Lasers Med. Sci.*, 1990.

[26] S. A. Prahl, A. J. Welch, M. P. Sartori, P. D. Henry, R. Roberts, G. L. Valderrama, K. Y. Jong, and M. J. Berry. Optical properties of normal human aorta from 200 to 2200 nanometers. *Lasers Surg. Med.*, 8:142, 1988 (abstract).

[27] J. C. Chan, J. W. Valvano, J. A. Pearce, L. J. Hayes, and S. A. Prahl. Thermal camera imaging to measure perfusion from the tissue surface. In J. W. Clark, P. I. Horner, A. R. Smith, and K. Strum, editors, *Phys. Med. Biol.*, volume 33, page 408, San Antonio, TX, 1988.

[28] G. L. LeCarpentier, S. Rastegar, A. J. Welch, S. A. Prahl, and H. Hussein. Comparative analysis of laser ablation of plaque using direct laser irradiation and a metal contact probe. In J. W. Clark, P. I. Horner, A. R. Smith, and K. Strum, editors, *Phys. Med. Biol.*, volume 33, page 17, San Antonio, TX, 1988.

[29] J. W. Valvano, S. A. Prahl, J. C. Chan, and J. A. Pearce. Thermal camera imaging to measure tissue blood flow. In *Sixth Southern Biomedical Engineering Conference*, Dallas, TX, 1987.

[30] W. F. Cheong, S. A. Prahl, A. J. Welch, M. J. C. van Gemert, and C. R. Denham. Optical properties of bladder tissue and optimal dosage predictions for photoradiation therapy. *Lasers Surg. Med.*, 6:190–191, 1986 (abstract).

[31] A. F. Badeau, P. A. Patel, S. A. Prahl, and J. W. Valvano. Thermal techniques to measure regional myocardial perfusion. 1986 (abstract).